

LAKE MACQUARIE CITY COUNCIL

Better Buildings Strategy



September 2018

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Cover: Vertical garden installed along wall at Masonic Hall, Speers Point

1 INTRODUCTION

In June 2014, Council adopted the Better Buildings Strategy for community buildings.

This 2018 version reflects changes in the green building industry and now applies to all Council buildings.

1.1 Vision

Council will lead by example and become an inspiration to the Lake Macquarie community by considering environmental sustainability in the design and construction of new buildings and renewal, replacement and upgrade projects. Council aims to minimise environmental impacts and resource use in the construction, operation and maintenance of Council buildings.

1.2 Defining sustainable buildings

A sustainable or green building incorporates design, construction and operational practices that significantly reduce or eliminate its negative impact on the environment and its occupants.

Building green is an opportunity to use resources efficiently while creating healthier environments for people to live and work in. Green buildings can also significantly reduce construction and performance costs (Green Building Council Australia 2016).

The built environment is so much more than just the physical structures around us. It consists of the homes, offices, schools and spaces where we spend the majority of our lives, raise our families, and come together with our communities. We spend 90 per cent of our time in these places, and changing the way we build and maintain them has the potential to have an enormous impact on our health and wellbeing (www.wellcertified.com).

1.3 Aims and scope

The primary aim of the Better Buildings Strategy is to incorporate sustainable building design and operating principles in all of Council's buildings.

Council's Better Buildings Strategy also aims to:

- Lead by example and showcase sustainable buildings to the community to inspire adoption of similar principles in development across the City;
- Reduce the environmental impacts of renewing, replacing and maintaining Council buildings;
- Reduce the operational costs associated with Council buildings;
- Improve the resource efficiency of Council buildings;
- Reduce reliance on non-renewable energy; and
- Provide a healthy indoor environment for those who work in and utilise Council buildings.

The Strategy applies to the design of any new or renewal projects, construction and operation of Council buildings.

1.4 Project planning and implementation

The financial implications of implementing the recommendations specified in this strategy must be considered on a project basis. Preparation of a business case that includes the capital cost, operational costs as well as any savings over the life of the building (financial and environmental) is required.

A total cost model for Council's community building portfolio will be developed to aid in the further quantification of building lifecycle costing.

2 COUNCIL BUILDINGS

Lake Macquarie City Council owns and manages a diverse range of buildings including community, Strategic Investment assets and operational buildings.

2.1 Community buildings in Lake Macquarie City

Council's community buildings include a diverse range of facility types, from large multi-purpose centres and libraries, to amenities for sports fields or public parks (Table 1).

Table 1: Existing Council community buildings by Type in Lake Macquarie City

Type of Building	Number
Community / multipurpose facilities	45
Child care facilities (including Family Day Care)	14
Libraries	9
Cultural Facilities	2
Swim centres	6
Public Amenities	135
Sporting Club Amenities	109
Sporting facilities (including amenities)	141
Surf life saving clubs	4
Age and disability support facilities (Meals on Wheels)	10
TOTAL	366



2.2 Commercial and operational buildings in Lake Macquarie City

Commercial and operational (staff facilities) buildings include a diverse range of facility types, from the Administrative Centre to strategic investment assets properties (Table 2).

Table 2: Existing Operational Buildings by Type in Lake Macquarie City

Type of Building	Number
Administrative Centre	1
Masonic Hall	1
Works Depot	1
Strategic Investment Assets	19
TOTAL	22

2.3 Building management and lifecycle

Council considers whole of life costing as part of the lifecycle of its assets. Asset Management Plans are developed for Council's facilities by building type. These detail how the organisation plans to manage and operate the assets at the agreed level of service, while minimising life cycle costs. Information regarding this aspect of Council's building management is contained within the relevant Asset Management Plan, prepared annually.

Community buildings are managed and operated by a number of Council departments and community organisations. Most new community buildings and major upgrades are planned and managed by Council's Community Planning department (provision of capital funds) and City Projects (design and construction works). Renewal and replacement projects and maintenance are the responsibility of Council's Asset Management department and CiviLake, respectfully with City Projects undertaking a significant amount of design and construction.

West Wallsend swim centre

3 SUSTAINABLE DESIGN ASSESSMENT TOOLS

3.1 Energy

Council is a member of the Green Building Council of Australia (GBCA). The GBCA has developed a range of assessment tools, known as Green Star, which are used for the design, assessment and rating of buildings. Successfully rated buildings are then certified at a certain number of stars, with four stars classified as 'Best Practice', five stars 'Australian Excellence' and six stars classified as 'World Leadership'.

Due to the cost for formal certification, it is anticipated that this tool would only be used by Council for large and complex new and renovated buildings, particularly those with high prestige. However, the Green Star tools can be used informally to guide sustainable design and Council can consider using Green Star Accredited Professionals on project teams to ensure that buildings are being designed and built to best practice.



3.2 NABERS

NABERS, or the National Australian Built Environment Rating System, is a system that measures and compares operational environmental performance of buildings. NABERS was launched in 1998 and, since mid-2010, it has been mandatory for all commercial office buildings with a net floor area greater than 2000m² to declare their NABERS rating upon lease or sale.

The NSW government has a policy, which states it will no longer lease any buildings with a NABERS rating of less than four stars. NABERS provides a 'reverse calculator' to assist commercial building owners to determine the most beneficial alterations for that building to improve their NABERS rating. Visit nabers.gov.au for more information.

Lake Macquarie City Administrative Centre solar panels.



4 BUILDING PERFORMANCE

4.1 Energy

Buildings owned by Council use energy in several different forms, including electricity, natural gas, liquefied petroleum gas (LPG) and diesel. Energy use comprises a large part of the running costs for these buildings.

Council has a greenhouse gas emissions reduction target of 3 per cent a year for its own operations (from a 2008 baseline). Energy efficiency works carried out on Council's community buildings make a significant contribution to achieving this target.

Recommendations to reduce energy use include:

4.1.1 Minor works recommendations

Minor works are small-scale upgrades that involve less than 30 per cent of total building gross floor area (GFA) or cost of less than \$150,000.

Lighting

Lighting (i.e. 'luminaires', including tubes and bulbs) to have an energy efficiency greater than 130 lumens/watt. In most situations, light emitting diodes (LEDs) will meet this efficiency rating and are recommended.

Air Conditioning

Wherever possible passive changes (e.g. insulation) to be in accordance with requirements of Section J of the Building Code of Australia (BCA) Volume 1, or the *Your Home Technical Manual*, before air conditioners are considered.

Air conditioning systems with an Energy Star Rating of 4.5 (energyrating.gov.au) or a Coefficient of Performance (COP) of 4.0 or greater are preferred, subject to site conditions. Systems to comply with.

- AS/NZS 3823.2-2011 Performance of electrical appliances, air conditioners and heat pumps,
- energy labelling and minimum energy performance standards (MEPS) requirements;
- and AS/NZS 4755.3.1:2012.

Hot Water Systems

Solar, thermal or heat pump hot water systems are preferred for new or replacement installation on Council buildings, subject to site conditions.

Hot water use should be minimised by actions identified in the Water section of this Strategy.

Hot water supply systems to comply with AS/NZS

3500.4:2003 Plumbing and Drainage – Heated water services and the Plumbing Code of Australia (National Construction Code: Volume 3).

Appliances are to have an Energy Star Rating of 3.5 or greater.

Thermal performance

Improving thermal performance of the building envelope is one of the most effective ways of reducing a building's energy consumption. The following simple measures are recommended.

- Roof colour with a solar absorptance value of less than 0.4 to minimise heat gain in summer is preferred.
- Heat reflective tinting or thermal film to be considered for buildings with west-facing windows or atriums.
- Insulation to be provided to walls, ceilings and/or floor as required.
- For ceilings, install reflective R4 insulation batts or blanket, or R4-equivalent insulated ceiling tile products (if chosen for use with suspended ceilings). For floors, install reflective R2 insulation.
- The insulation products shall not be loose fill and must contain a minimum of 60 per cent recycled content, where possible. The product must comply with AS/NZS 4859.1: Materials for the thermal insulation of buildings and is to be installed according to the manufacturer's specifications and AS 3999-1992 *Thermal insulation of dwellings*.

4.1.2 Major works recommendations

Major works are new builds and extensions as well as renewal/replacement projects with a gross floor area (GFA) greater than 30 per cent and a capital cost above \$150,000. Major works are to:

- Incorporate passive design measures to maximise the use of natural ventilation, cooling and natural lighting;
- Minimise light pollution through best practice lighting design (AS 4282-1997: Control of Obtrusive Effects of Outdoor Lighting);
- Strive for long-term energy resilience by installing appropriately sized clean energy generation systems, such as solar photo-voltaics or tri-generation wherever viable;
- Consider energy consumption modelling, to determine optimal running costs of various designs, operations and appliances; and
- Consider thermal performance modelling for determination of optimal designs and features for buildings with a need for thermal control (such as air-conditioned spaces).

4.2 Water

Council has developed Water Cycle Management (WCM) Guidelines to address water management issues associated with development in the City. These Guidelines provide direction on how to achieve the water objectives outlined in Council's *Development Control Plan* (DCP). They provide practical advice for implementing WCM principles and explore practical water management options.

Water efficient appliances – minimum requirements:

- Tapware – 4 stars WELS (Water Efficiency Labelling Scheme) rated or better
- Showerheads – 3 stars WELS rated and less than 7.5L/min flowrate
- Toilets – 4 stars WELS rated
- Urinals – 4 Star WELS rated
- Where appropriate, hot water should not be connected to or should be reduced to zero flow at hand basins so that only cold water is provided.

Stormwater management – the building should demonstrate compliance with Council's DCP provisions (Site Discharge Index of 0.1) using Water Sensitive Urban Design Principles and Council's Water Cycle Management Guidelines.

For works involving landscaping, use a Certified Practising Soil Scientist to provide recommendations for the prevailing soils and the desired landscaping outcomes.

Irrigation – where an irrigation system is required, the system is to be designed by a competent Irrigation Designer, with input from a Certified Irrigation Agronomist, as required. All irrigation systems are to be compatible with Council's Central Irrigation Control system.



Lake Macquarie City Art Gallery solar panels.



Modular green wall at Masonic Hall (installed 2015).

4.3 Indoor environment quality

Indoor environment quality (IEQ) considerations include:

- Air quality and ventilation;
- Monitoring and management of pollutants;
- Lighting
- Views;
- Thermal comfort;
- Occupant control;
- Noise levels and acoustic comfort;
- Materials or product specifications;
- Indoor plants; and
- Occupant wellbeing.

4.3.1 Green walls

There are now a number of buildings within the City with green walls. The Masonic Hall at Speers Point and the amenities building at Warners Bay are two of these sites.

A well-designed and maintained green roof, wall or facade can. (Green Roofs and Walls Policy 2014, City of Sydney).

- improve building efficiency through heating, cooling and sound insulation;
- provide extra space for urban greening, food production and private open space;
- slow and clean stormwater;
- reduce the impacts of the urban heat island effect;
- improve air quality;
- provide amenity and liveability;
- increase the absorption of carbon dioxide;
- create more habitat to support biodiversity;
- boost the efficiency of solar panels; and
- extend roof life.

Key considerations for designing and building a green roof or wall can be found within this guide from the City of Sydney.

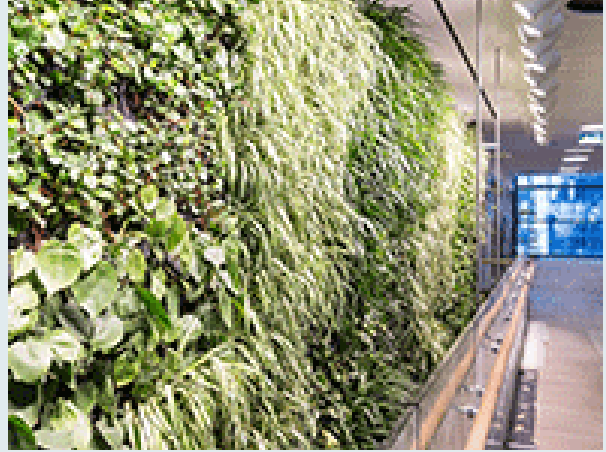
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Case study

Australia's First Breathing Green Wall installed at Barangaroo Offices (Tower 3 – Barangaroo)

(Living Architecture Monitor, 6 July 2016)

Positioned within their offices at new Tower 3 International Towers Sydney, by Rogers Stirk Partnership, the massive breathing wall is an active, modular green wall system, made up of 5000 plants, which has been scientifically proven to speed up the removal of air pollutants, such as carbon dioxide (CO₂) and volatile organic compounds (VOCs).



By reducing the amount of CO₂ in the internal office environment, the green wall will provide occupants with an environment that is less susceptible to headaches, lethargy and poor productivity as well as energy efficiency and reduced air conditioning costs as it provides a cooling effect to the surrounding air temperature.



Integrated rain gardens at Warners Bay amenities buildings (constructed in 2013)

5 WASTE AND CONSTRUCTION MATERIALS

5.1 Construction and demolition waste

The management of this aspect of the building lifecycle is governed by the development assessment process, specifically by the preparation of a Waste Management Plan (as required by Waste Management Guidelines supporting Council's DCP) which specifies waste quantities by type, and disposal methods. Construction and demolition impacts can be significantly reduced through the following:

- Minimise construction waste by choosing the right quantity of materials and ensure that any unused materials can be returned to the manufacturer;
- When renewing or replacing a Council building, maximise reuse of materials. For on-site reuse, check if NSW Resource Recovery Exemptions apply. For off-site reuse, check NSW Resource Recovery Orders and Exemptions e.g. for plasterboard and organic waste (epa.nsw.gov.au/wasteregulation/orders-exemptions.htm);
- Select materials with lower embodied energy and environmental impacts;
- Analyse the expected quantities of demolition/construction waste by waste streams and identify the most appropriate disposal method and facility, focusing on maximising reuse and/or recycling;
- Provide adequate collection receptacles to allow for correct separation of waste streams and to maximise recycling;
- Allow adequate space for waste storage to allow for recycling, food and garden waste (where applicable), other waste streams such as pallets and cardboard (if some commercial level building use) and residual garbage bins, and composting or worm farming by building occupants if relevant to building use; and
- Require disposal of waste only to EPA licenced sites (or small volume recycling recovery facilities that do not require an EPA licence but have development approval).

5.2 Stripout waste guidelines

City of Sydney Council has published Stripout Waste Guidelines on its website (www.sydneybetterbuildings.com.au), that set a new best practice standard to achieve a minimum resource recovery target of 60 per cent during the office strip-out and refurbishment process. Currently, an average of just 21 per cent of fit-out waste across Sydney is diverted from landfill. This represents around 25,000 tonnes of materials including glass, metals, plasterboard, ceiling tiles, carpet and furniture that could be reused or recycled each year in Sydney's CBD alone. These guidelines and its associated workbook provide a framework to improve stripout operations, procurement processes, and ensure consistent measurement and reporting. They are aligned with Green Star Interiors and Performance rating tools.

The 60 per cent recovery target needs to be considered for stripout activities for Council's buildings, in the context of achieving the City's waste diversion targets (*Lake Macquarie Waste Strategy 2015-2023*).

5.3 Waste from building use

New and renovated buildings provide the opportunity for best practice waste management during ongoing operations. The GBCA Green Star Performance tool provides additional guidance (gbca.com.au). Planning and design should include:

- Provision for on-site source separation and collection.
- An analysis of the expected quantities of waste by the waste streams: general waste, commingled recyclables (glass, cardboard, paper, rigid plastics, soft plastics, cans), special recyclables (other metals, moulded polystyrene (EPS), toner cartridges, e-waste, oils, household batteries, car batteries, gas cylinders, fire extinguishers, smoke alarms, light globes, fluorescent light tubes), organics (green waste, food waste);
- provision of practical collection sites and space for appropriate receptacles for general waste, commingled recyclables, problem recyclables (separate bin per type), e-waste, other bulk waste if relevant, and organics.
- Consultation with Sustainability and Waste, Environment and Rangers (WER) departments during the planning stage to ensure that Council waste collection during use of the facility is

possible and there are no access restrictions for the collection vehicles.

- Consultation with Sustainability department for assistance regarding education, recycling providers and disposal options.

5.4 Adaptive reuse

The process of reusing an old site or building, differing from its original purpose, is called adaptive reuse. It makes an important contribution to reducing the generation of construction and demolition waste.

Council has adaptively reused several buildings in the city, a list of these is supplied in Appendix B.

It is recommended that adaptive reuse practices continue within the City. Consideration of thermal performance is required as part of the assessment of adaptive reuse versus new building construction.

Case study

Masonic Hall Speers Point

Council renovated this unused hall facility in 2015-16 for use as a multi-purpose facility providing functional spaces for meetings, training and workshops, community meetings and Council's corporate fitness program. The project won the 2015 Australian Property Institute JLL Heritage Award category for the refurbishment and re-purposing of a locally significant building.



6 TRANSPORT

Because of the variety of services and facilities provided by Council's buildings, these facilities form an important destination for journeys by City residents and Council staff. The following recommendations may reduce the need for visitors to use private cars to access Council facilities, and to assist Council staff to use alternative means to commute to and from work:

- Provide dedicated car spaces in favourable locations for hybrid and electric vehicles and motorcycles or scooters
- For larger facilities, a dedicated electric vehicle parking space, equipped with Level 2 charging facilities, for use by both staff and visitors should be considered
- Support active transport in accordance with the *Lake Macquarie Cycling Strategy 2011-2021*, and the *Lake Macquarie Footpath Strategy*
- When planning the location of new facilities, preference should be given to those sites that have the best active and public transport access, that still meet the facility's core functional requirements.

Where possible, they should be connected to:

- An off-road system of linked open space
- Shared paths, and/or separated bike lanes on roads; and/or
- Nearby public transport nodes and other amenities
- Provide end of trip facilities (bicycle storage / showers and lockers) in locations that support the use of active transport in commuting by either the public or staff. The Green Star tool gbca.org.au/green-star/rating-tools/green-star-design-as-built/the-rating-tool/ offers guidance on how to provide end of trip facilities
- Provide one of the two preferred Council bike rack designs (in marine grade stainless steel when close to the lake or ocean) and cycle signage to encourage riding to Council facilities.

Council has an internal Active Transport Working Group that can provide comments on proposed master plans and facility designs to maximise the opportunities to encourage cycling.



Adopted bike stand products used by Council



Bike stands as street art used to enhance public spaces (Marmong Point)

7 BUILDING OPERATIONS

7.1 Building optimisation

Buildings are dynamic and maintaining energy reductions is an ongoing challenge. A Building Optimisation System (BOS) is required to provide building owners with the assurance that savings will be achieved on an ongoing basis, avoiding the 'fix and forget' in a typical retrofit approach. Without a BOS, typically resource consumption will return to its original levels after an initiative if it is left unmonitored. With time, inefficiencies creep into a building's operation, increasing utility use and operational cost. A BOS identifies these problems on an ongoing basis, assisting building managers to maintain maximum operational efficiency through optimising existing infrastructure.

Alternative descriptions used for BOS in the industry include AFD (automatic fault detection), FDD (fault detection and diagnostics) and Big Data Analytics. At a high-level, a BOS sits on top of the existing control systems and translates performance data into savings opportunities. Performance data may include metering, lighting, HVAC, water treatment and any other equipment connected with digital outputs. The BOS combines numerous data inputs and customised algorithms to identify where equipment is not running optimally.

BOS should be installed at high energy consuming sites, including sites with relatively complex mechanical systems such as large HVAC systems, pump sets, and water heaters. At a minimum this should include major administration buildings, swim centres, holiday parks, libraries, larger cultural and community buildings such as Lake Macquarie Art Gallery and Swansea Multi-Purpose Centre. BOS is currently being utilised at West Wallsend Swim Centre and the Administrative Centre. Installation of BOS at Council's top 20 energy consuming sites is proposed over the next four financial years (refer to Appendix C).

7.2 Electricity and gas monitoring

Electricity and gas sub-monitoring is currently used in some Council buildings and has been found to achieve the following objectives:

- Determine how buildings are currently using electricity and gas
- Identify any peculiar or inefficient energy use patterns
- Suggest possible improvements or further investigation where it is determined energy can be saved.

Future potential of sub-metering may include:

- Provision of information to facility managers regarding electricity use and running costs of various appliances. For example, real time monitoring combined with a wall-mounted display enables facility users and managers to test the consumption of various appliances by comparing total site use when the appliance is on or off.
- Verification of energy saving targets and 'ground-truthing' of estimated upgrade results. For example, a monitoring system placed on a specific facility or piece of equipment a few months ahead of scheduled upgrade allows comparison of pre and post-upgrade performance. This means that energy savings can be quantified to calculate Energy Savings Certificates (ESCs), and detect incorrect operations.
- Provide specific groups with energy use reports and recommendations.
- Continually monitor large energy use sites to track energy use trends and identify issues as they arise.

7.3 Water monitoring

Detailed water monitoring (smart metering through data loggers) is currently undertaken at sites that have risk factors that could result in significant water use that would not be easily detected or rectified. High-risk sites can be characterised by a long, old and/or complex water supply network, high water consumption and/or irregular demand patterns, such as swim centres, holiday parks and sports fields with irrigation systems.

Where a facility is identified as a high-risk site, consideration should be given to the type of water meter to be installed and potential sub-metering arrangements.

Facility Managers are able to access information from Council's smart metering system via an online monitoring portal (SUMS) and receive automated alerts that are customised to meet their operational and reporting requirements. Facilities with current smart metering capability are listed in Appendix C.

It is recommended that Council's energy and water monitoring, reporting and optimisation system for top energy and water consuming facilities be expanded. As part of this expansion it is important to consider the provision of relevant information to building users and Facility Managers on a regular basis.

7.4 Commissioning

Commissioning is a vital stage of most construction projects. Effective commissioning can help ensure that building fabric and services operate as intended by the design team, in an efficient and effective way (GBCA Technical Manual, 2008).

During the design phase, consideration must be given to how specific components (e.g. irrigation, lighting, heating and/or cooling systems) will be installed, commissioned, operated and maintained over the long term. This will require the collaborative involvement of key stakeholders including users, facility managers, technical experts, asset management and maintenance personnel. Adherence to Council's Capital Works Process contributes to the likely success of this stakeholder collaboration.

During the construction process, a range of factors (including previously unknown site conditions) can result in changes to the actual building or building components. Where a specialist technology or system has been included in the design, it is vital that the system is installed and operated in an efficient and effective manner. Ongoing and effective maintenance is also vital.

To ensure appropriate installation, engage the designer (or another suitably qualified professional other than the contractor) to provide independent site supervision services during construction/installation. These services could also extend to overseeing the commissioning of the system, providing detailed work as executed drawings and undertaking performance inspections or checks immediately prior to handover. The exact nature and extent of independent site supervision services required should be assessed on a case-by-case basis. Ideally, this assessment would be undertaken in close collaboration with the relevant Council staff (including subject matter experts).

7.5 Materials

The selection of materials for a specific project involves a number of considerations that are often unique to the particular project. These matters are best dealt with in the design phase with input from relevant stakeholders. Any specific material requirements for construction must be specified in the relevant construction documentation (e.g. drawings and specifications).

To facilitate the use of sustainable materials in Council buildings, trials will be undertaken at suitable Council-owned sites.



THE WAY FORWARD

	ACTION	TIMEFRAME	RESPONSIBLE DEPARTMENT/S
1	Work with Better Buildings Strategy group and stakeholders of current and future building efficiency projects to reduce energy and water consumption	1-5 years	Sustainability
2	Develop educational material for display onsite to inform building users of design features and operation of appliances to ensure optimal performance (branding for Better Buildings to be developed)	3-5 years	Sustainability
3	Asset Management System - include appropriate information in the new system to allow for inclusion of sustainable buildings information data and trade-off between operational and maintenance costs	1-3 years	Asset Management Sustainability Corporate Information
4	Expand Council's energy and water monitoring, reporting and optimisation system to Council's top energy and water consuming community facilities and provide relevant information to users and facility managers on a regular basis	3-5 years	Sustainability Community Planning
5	Select three sites for trial of sustainable building materials	1-2 years	Sustainability City Projects Assets
6	Continue to explore options for adaptive reuse of buildings within the City	3-5years	Community Planning Asset Management Integrated Planning



Glossary

Accredited Professional – A building professional who has attended a one day Green Star Accredited Professional training course, has passed the associated examination and is registered with the Green Building Council of Australia

BMS – Building Management System. The BMS automatically controls the building services systems to maintain temperature, humidity, ventilation rates and lighting levels to predetermined load requirements and to provide safe, efficient operation of equipment.

Commissioning – The process of putting building services systems into active service. This includes testing and adjusting HVAC, electrical, plumbing and other systems to assure proper functioning and adherence to design criteria, and instructing building representatives in their use.

Embodied energy - the energy consumed by all of the processes associated with the production of a building, from the acquisition of natural resources to product delivery, including mining, manufacturing of materials and equipment, transport and administrative functions (CSIRO)

Green building - A Green building incorporates design, construction and operational practices that significantly reduce or eliminate its negative impact on the environment and its occupants; an opportunity to use resources efficiently while creating healthier environments for people to live and work in.

Gross floor area (GFA) – The total floor area of all parts of a building that are permanently covered and can be protected from the elements. Car parking

(including under-cover car parking) should not be included in the GFA.

HVAC – Heating, Ventilation and Air Conditioning. Mechanical systems that provide heating, ventilation and air conditioning in buildings.

IEQ – Indoor Environment Quality. Covers issues such as indoor air quality, thermal comfort, illumination, daylight, views, acoustics and occupant control of building systems.

Maintenance costs – Costs incurred to keep a building in good condition and/or good working order.

Mechanical ventilation – Ventilation systems that use fans or other electrically operated air movement devices to provide ventilation to a building.

Natural ventilation – The process of supplying and removing air in building spaces by natural means, by using openings in the façade (e.g. windows), mechanical ventilators, solar chimneys and infiltration processes.

Operational costs – Operating (operational) costs are the expenses related to the day-to-day operation of a building.

Passive design – Design that reduces the energy consumption of a building by taking advantage of natural heating, cooling and lighting.

Renewal – Expenditure on an existing asset, which returns the service potential or the life of the asset up to that which it had originally.

Replacement – Expenditure that will create a completely new asset to replace an asset that has reached the end of its useful life.

Thermal comfort – A means of describing occupant comfort which takes into account air temperature, radiant temperature, humidity, draught, clothing value and activity rates.

Upgrade – Expenditure which enhances an existing asset to provide a higher level of service or expenditure that increases the life of the asset beyond its original lifespan.

Waste management plan – A document which outlines how construction and demolition waste will be collected for recycling and recycled, and how the recycling of that waste will be recorded.

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- Your Home Technical Manual <http://www.yourhome.gov.au/energy>

Appendix A

Related Council policies and strategies

- Environmental Sustainability Policy
- Greenhouse Emissions Reduction Targets Policy
- Community Strategic Plan 2017-2027 Key Focus Area: Unique Landscape – Optimise land use to meet the social, environmental and economic needs of the City
- Taking Action Together: Staff Sustainability Strategy 2018-2027
- Asset Management Strategy 2010-2020
 - Key Strategy 5 – Maintain a framework for accurate financial reporting of asset condition and asset performance including sustainability indicators
- Community assets - Asset Management Plan
- Delivering Our Future Resourcing Strategy 2017-2027
- Asset Management Planning
 - Strategic priority 4 – Prepare and maintain an up-to-date Asset Management System
 - Strategic priority 5 – Maintain a framework for accurate financial reporting of asset condition and asset performance including sustainability indicators.
- Lake Macquarie Arts, Heritage and Cultural Plan 2017–2027
- Lifestyle 2030
 - Strategic direction two – Outcome 2.3: the resources required to construct and operate new developments are minimised, the embodied energy in all new development is reduced and new development increasingly relies on methods and products that minimise the ecological impact of design and construction.
- Environmental Sustainability Action Plan 2014–2023
 - Energy target: 45 per cent per capita reduction in citywide greenhouse emissions. 600kW renewable energy installed on Council facilities
 - Waste target: 75 per cent reduction in per capita waste to landfill from the City
 - Water target: 12 per cent reduction in potable water use from Council's operations
 - Transport target: increase in walking and cycling trips to 6 per cent of total trips within the City
 - Contaminated land target: 50 per cent of known contaminated land in Council's care and control assessed for risk to human health and prioritised for risk mitigation measures.
 - Natural hazards: No net per capita increase in exposure of the community to risks from the environment. 7 per cent reduction in exposure of the community to risks from natural hazards.
- Cycling Strategy 2021

- Lake Macquarie City Council, Sports Facility Strategy 2015–2020
 - Focus area two: Facility quality and suitability: consider social, environmental and economic issues when planning new or improving existing sports facilities e.g.: installation of energy efficient infrastructure.
- Heritage Strategy

Objective nine: To promote sustainable heritage development in Lake Macquarie City as a tool for heritage management.

- Promote sustainable development as a tool for heritage management.
 - Continue to question rigorously, proposals to demolish structures where there is an option to adapt and reuse.
 - Continue to promote the Burra Charter 2013 principles of doing as much as is necessary but as little as possible in intervening in heritage fabric.
 - Encourage the use of water harvesting, energy efficiency and conservation and recycling with developments in and around heritage items.
 - Promote the adaptive reuse and creative intervention in existing and significant heritage structures as being the cornerstone of sustainable building and development practice.
- Water Cycle Management Guideline
 - Development Control Plan and Energy Efficiency Design Guideline for Commercial and Industrial Development.
 - City of Lake Macquarie Waste Strategy (2015-2023)
 - Waste diversion targets

Appendix B

List of buildings adaptively reused in the City

Site	Reuse details
Lambton Colliery (Redhead)	Men's Shed
Swansea/Blacksmiths Visitors Information Centre	Men's Shed
Marmong Point Community Hall	Woodworkers Club
West Wallsend Bowling Club	Leased by Mercy Community Services
Holmesville Tennis Courts	Community garden
Masonic Hall, Speers Point	LMCC operational facility



Holmesville Tennis Courts



Blacksmiths Mens Shed

Appendix C

Council facilities with Water sub-metering, Energy sub-metering or Building Optimisation System (BOS) installed

Site	Water monitoring	Energy Sub-metering	Building Optimisation System
Administrative Centre			X
Balcomb Oval	X		
Belmont Bayview Caravan Park	X		
Belmont Library			P
Belmont Pines Holiday Park	X		P
Belmont Sports Complex	X		
Blacksmiths Holiday Park	X		P
Cardiff Oval	X		
Chapman Oval	X		
Charlestown Library			P
Charlestown Oval	X		
Charlestown Swim Centre	X	G	P
Edgeworth Oval	X		
Ernie Calland Oval	X		
Feighan Oval	X		
Finnan Oval	X		
Gibson Oval	X		
Hunter Sports Centre	X		
John Street Oval	X		
Johnston Oval	X		
Kahibah Oval	X		
Lake Macquarie Art Gallery			P
Lisle Carr Oval	X		
Lyall Peacock Oval	X		
Lydon Oval	X		
Macquarie Oval	X		
Marks Oval	X		
Masonic Hall			P
Morisset Swim Centre	X		
Northlakes Oval	X		

Appendix C - continued

Site	Water monitoring	Energy Sub-metering	Building Optimisation System
Rathmines Oval	X		
Ron Hill Oval	X		
Rural Fire Service Headquarters			P
Speers Point Library		E	P
Speers Point Swim Centre	X		P
St Johns Oval	X		
Swansea Gardens Holiday Park	X		P
Swansea Multipurpose Centre		E	P
Swansea Swim Centre	X		P
Toronto Library & Commercial Centre			P
Toronto Swim Centre	X		P
Tredinnick Oval	X		
Ulinga Oval	X		
Valentine/Eleebana Oval	X		
Wangi Point Holiday Park	X		P
West Wallsend Swim Centre	X	E	X
Works Depot		E	P
Works Depot Truck Wash	X		

KEY:

E – Electricity sub-meter installed

G – Gas sub-meter installed

P – Building Optimisation System proposed

X – Water sub-meter or Building Optimisation System installed

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Audience: Council-wide

Department: Sustainability

Officer: Sustainable Living Officer – Melissa Bailey

Review timeframe: Four years

Next Review Due: June 2022

